What is claimed is:

1. A semiconductor device comprising:

a collector region of a first conduction type;

an emitter region of the first conduction type;

a base region of a second conduction type opposite to the first conduction type located between the collector region and the emitter region,

wherein the free carrier density of the base region where no depletion layer is formed is smaller than the space charge density of a depletion layer formed in the base region.

2. The semiconductor device as claimed in claim 1, wherein the free carrier density is smaller than the space charge density by one or more orders of magnitude.

3. The semiconductor device as claimed in claim 1, comprising a silicon carbide semiconductor as a base semiconductor material.

4. A semiconductor device comprising:

a collector region of a first conduction type;

an emitter region of the first conduction type;

a base region of a second conduction type opposite to the first conduction type located between the collector region and the emitter region,

wherein the base region includes a punch-through stop region of the second conduction type adjacent to the emitter region, and

wherein the free carrier density of the punch-through stop layer where no depletion layer is formed is smaller than the space charge density of a depletion layer formed in the punch-through stop layer.

5. The semiconductor device as claimed in claim 4, wherein the space charge density of the base region is smaller than the space charge density of the punch-through stop region.

6. The semiconductor device as claimed in claim 4, wherein the free carrier density of the punch-through stop region where no depletion layer is formed is smaller than the space charge density of a depletion layer formed in the punch-through stop region by one or more orders of magnitude.

7. The semiconductor device as claimed in claim 4, comprising a silicon carbide semiconductor as a base semiconductor material.

8. A semiconductor device comprising:

a collector region of a first conduction type;

a base region of a second conduction type opposite to the first conduction type formed on the collector region; and

an emitter region of the first conduction type formed on the base region,

wherein the collector region, the base region, and the emitter region are made of a silicon carbide semiconductor,

wherein the base region is doped with boron.

9. A manufacturing method of manufacturing a semiconductor device according to claim 1, the manufacturing method comprising: forming the base region by use of a first impurity of a second conduction type which serves to generate an impurity level with a predetermined depth from the edge of the band gap of a base semiconductor material of the semiconductor device while the free carrier density is smaller than the space charge density by a predetermined value.

10. The manufacturing method of manufacturing a semiconductor device as claimed in claim 9, wherein the base region is formed by semiconductor epitaxial growth with the first impurity as a dopant.

11. The manufacturing method of manufacturing a semiconductor device as claimed in claim 9,

wherein the semiconductor device is made of a silicon carbide semiconductor as a base semiconductor material.

12. The manufacturing method of manufacturing a semiconductor device as claimed in claim 11, wherein the first impurity is an impurity which can be used to generate an impurity level apart from the edge of the band gap of the base semiconductor material by more than 250 meV.

13. The manufacturing method of manufacturing a semiconductor device as claimed in claim 11, wherein the first impurity is boron.

14. A manufacturing method of manufacturing a semiconductor device according to claim 1, the manufacturing method comprising: forming the base region by use of at least a first impurity of the second conduction type which serves to generate an impurity level with a predetermined depth from the edge of the band gap of a base semiconductor material of the semiconductor device while the free carrier density is smaller than the space charge density by a predetermined value, and a second impurity of the second conduction type which serves to generate an impurity level with a depth from the edge of the band gap of the base semiconductor material shallower than the predetermined depth of the first impurity.

15. The manufacturing method of manufacturing a semiconductor device as claimed in claim 14, wherein the base region is formed by semiconductor epitaxial growth with the first impurity as a dopant.

16. The manufacturing method of manufacturing a semiconductor device as claimed in claim 14, wherein the semiconductor device is made of a silicon carbide semiconductor as a base semiconductor material.

17. The manufacturing method of manufacturing a semiconductor device as claimed in claim 16,

wherein the first impurity is an impurity which can be used to generate an impurity level apart from the edge of the band gap of the base semiconductor material by more than 250 meV.

18. The manufacturing method of manufacturing a semiconductor device as claimed in claim 16, wherein the second impurity is an impurity which can be used to generate an impurity level at positions shallower than the positions 250 meV apart from the edge of the band gap of the base semiconductor material.

19. The manufacturing method of manufacturing a semiconductor device as claimed in claim 16, wherein the first impurity is boron.

20. The manufacturing method of manufacturing a semiconductor device as claimed in claim 16, wherein the second impurity is aluminum.

21. A manufacturing method of manufacturing a semiconductor device according to claim 4, the manufacturing method comprising:

forming the base region;

covering the base region with a mask;

patterning the mask to form an opening through which part of the base region is exposed;

forming the emitter region by doping the base region with an impurity of the first conduction type through the mask; and

forming a punch-through stop region by doping the base region with a first impurity of a second conduction type which serves to generate an impurity level with a predetermined depth from the edge of the band gap of a base semiconductor material of the semiconductor device while the free carrier density is smaller than the space charge density by a predetermined value.

22. The manufacturing method of manufacturing a semiconductor device as claimed in claim 21,

wherein the impurity with which the base region is doped is a second impurity of the second conduction type which serves to generate an impurity level with a depth from the edge of the band gap of the base semiconductor material shallower than the predetermined depth of the first impurity.

23. The manufacturing method of manufacturing a semiconductor device as claimed in claim 21, wherein the base region is formed by semiconductor epitaxial growth.

24. The manufacturing method of manufacturing a semiconductor device as claimed in claim 21, wherein the semiconductor device is made of a silicon carbide semiconductor as a base semiconductor material.

25. The manufacturing method of manufacturing a semiconductor device as claimed in claim 24, wherein the first impurity is an impurity which can be used to generate an impurity level apart from the edge of the band gap of the base semiconductor material by more than 250 meV.

26. The manufacturing method of manufacturing a semiconductor device as claimed in claim 24, wherein the second impurity is an impurity which can be used to generate an impurity level at positions shallower than the positions 250 meV apart from the edge of the band gap of the base semiconductor material.

27. The manufacturing method of manufacturing a semiconductor device as claimed in claim 24, wherein the first impurity is boron.

28. The manufacturing method of manufacturing a semiconductor device as claimed in claim 24, wherein the second impurity is aluminum.